DOE Solid State Lighting Status and Overview

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Office of Energy Efficiency and Renewable Energy
Buildings Technologies Program

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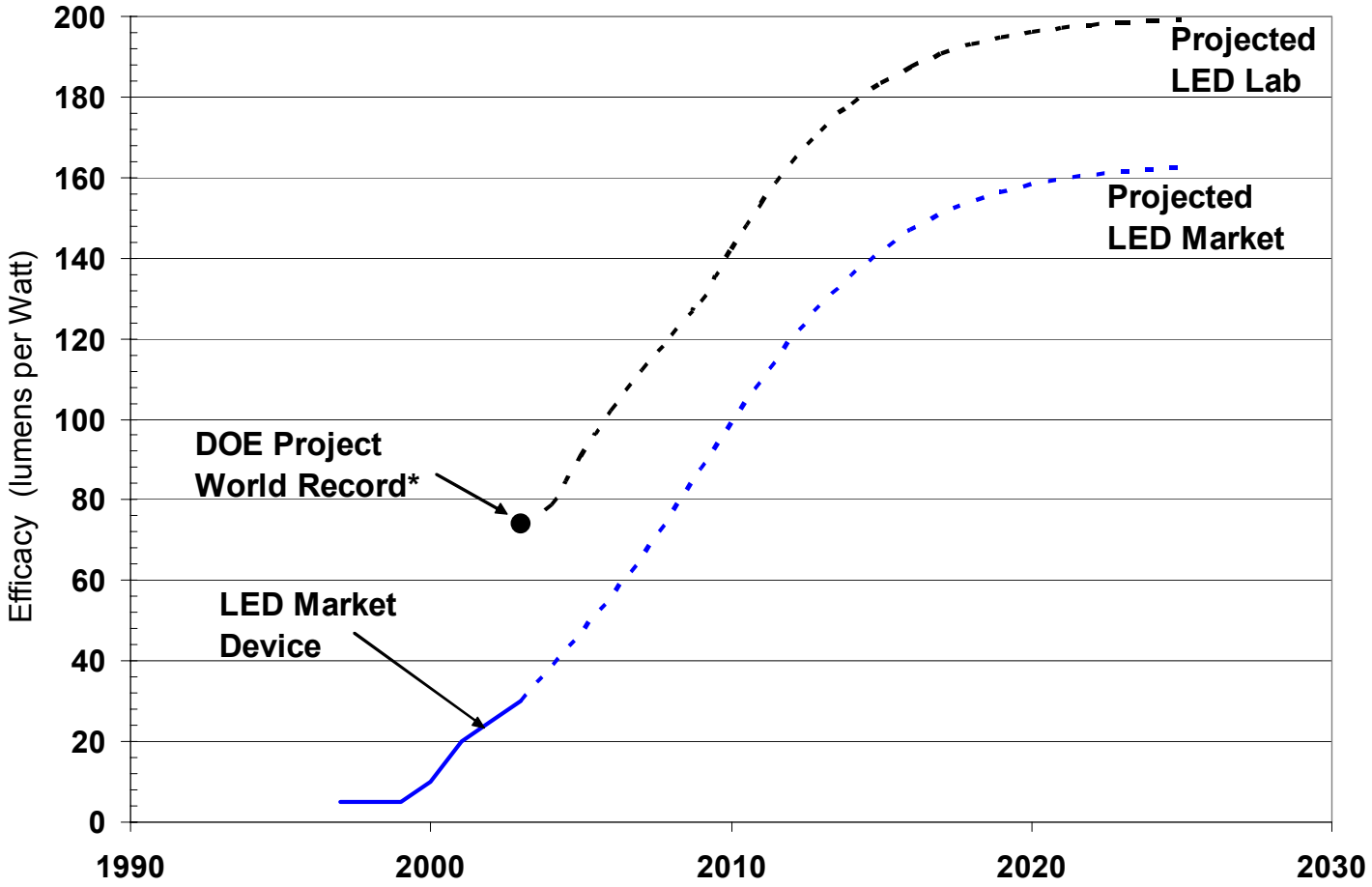
Mission Statement

Solid-State Lighting Program Mission

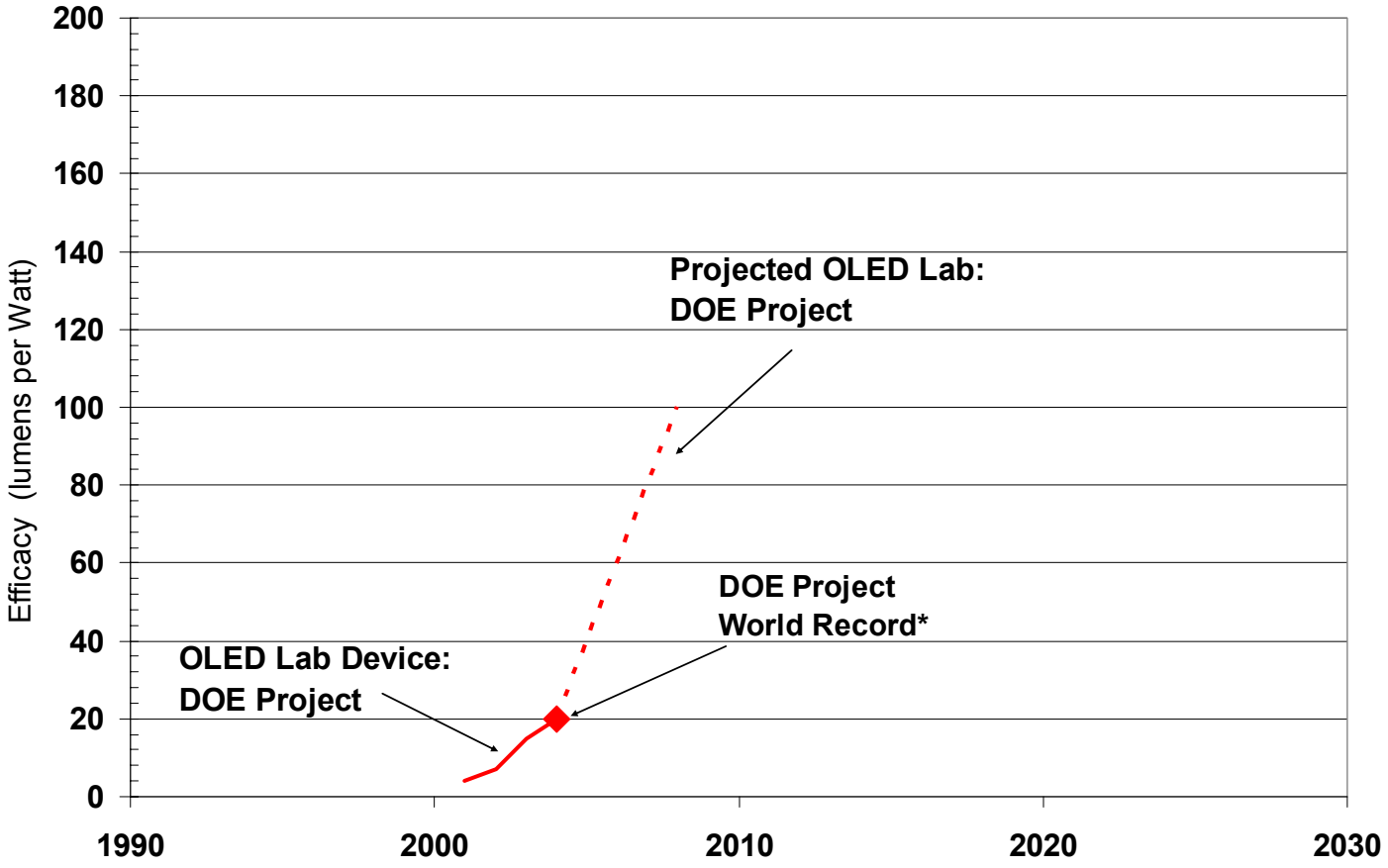
Guided by a government-industry partnership, the mission is to create a new market for high-efficiency, general illumination products through the advancement of semiconductor technologies, to save energy and enhance the quality of the lighted environment.

White-Light LED Efficacy Targets



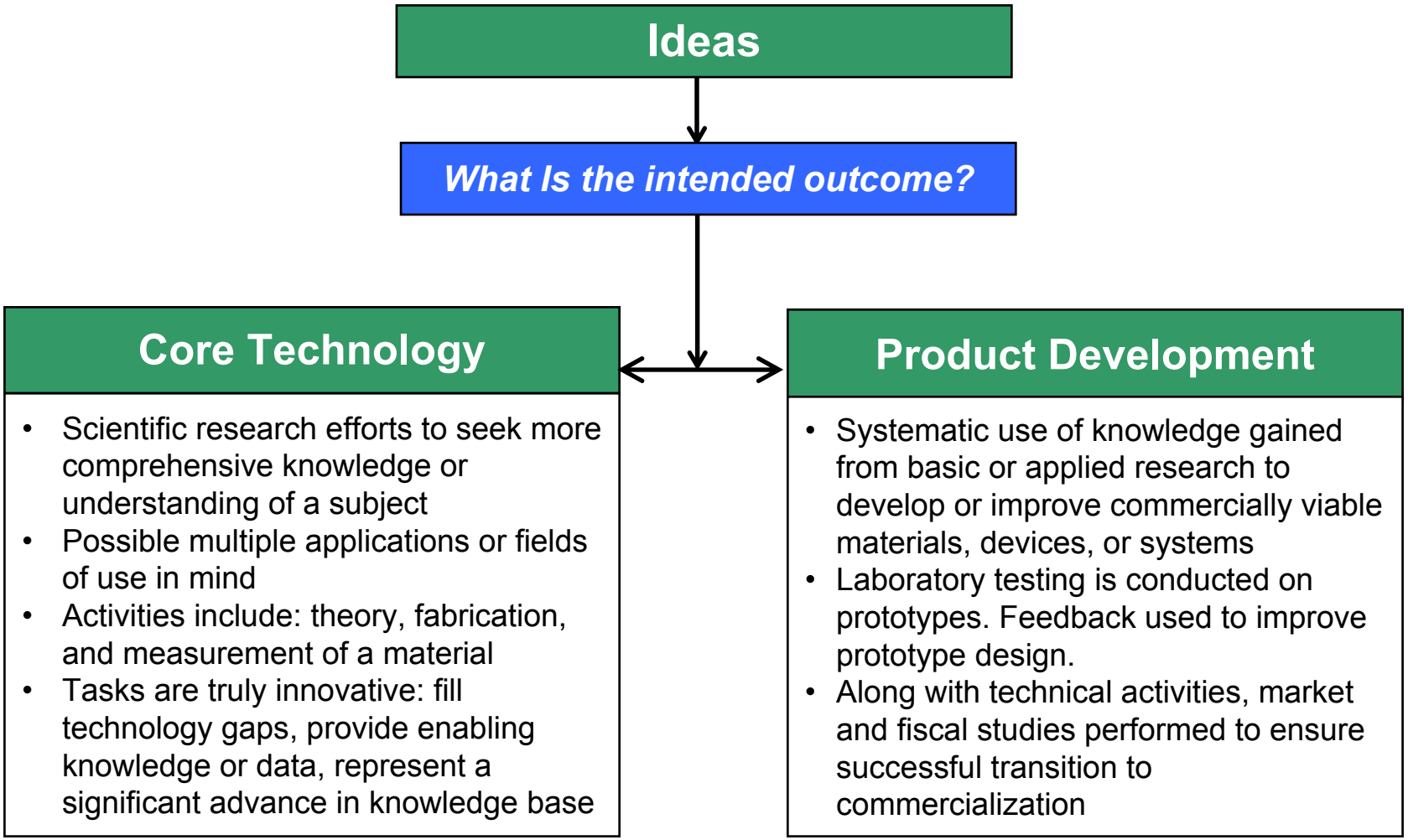
* Note: World record represents a 74 lumen per Watt white-light LED laboratory device

White-Light OLED Efficacy Targets



* Note: World record represents a 20 lumen per Watt white-light OLED laboratory device

SSL Research Agenda



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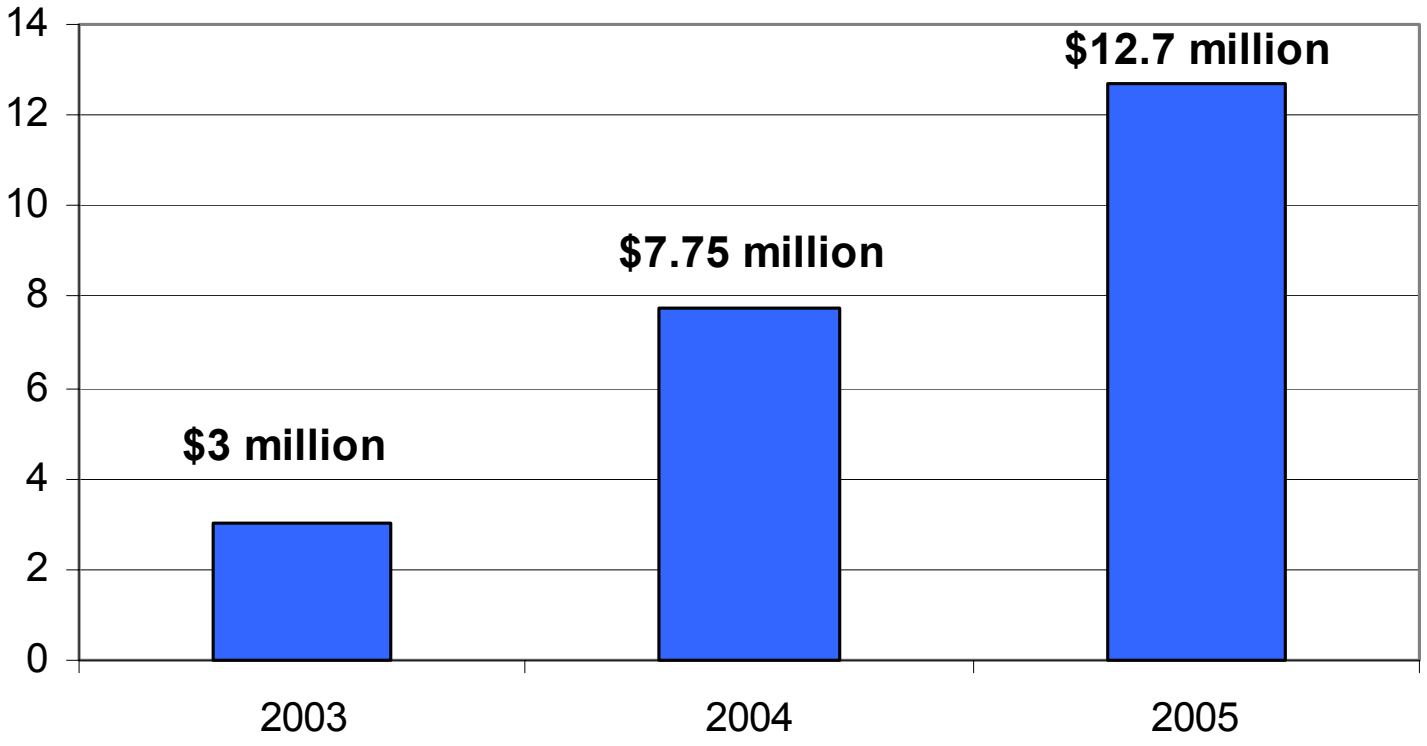
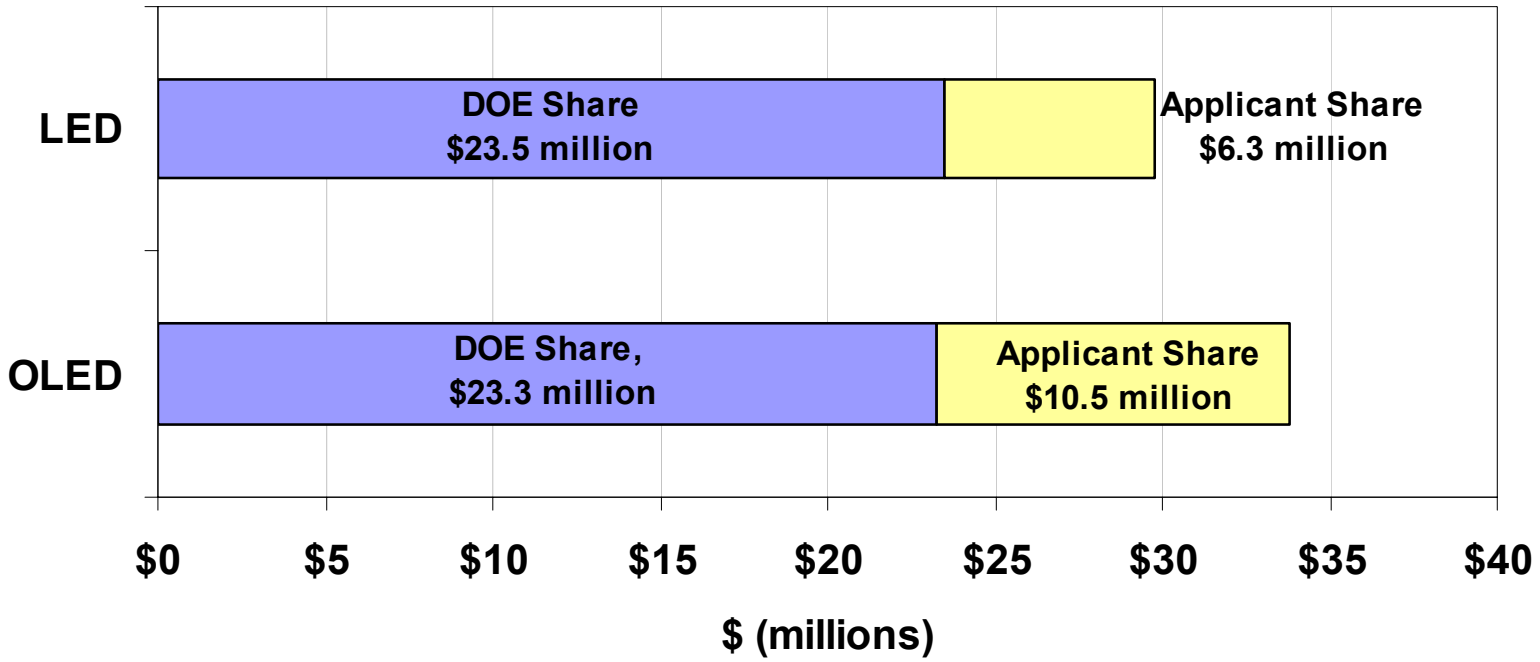
Congressional Appropriation ($million)



SSL R&D Project Funding

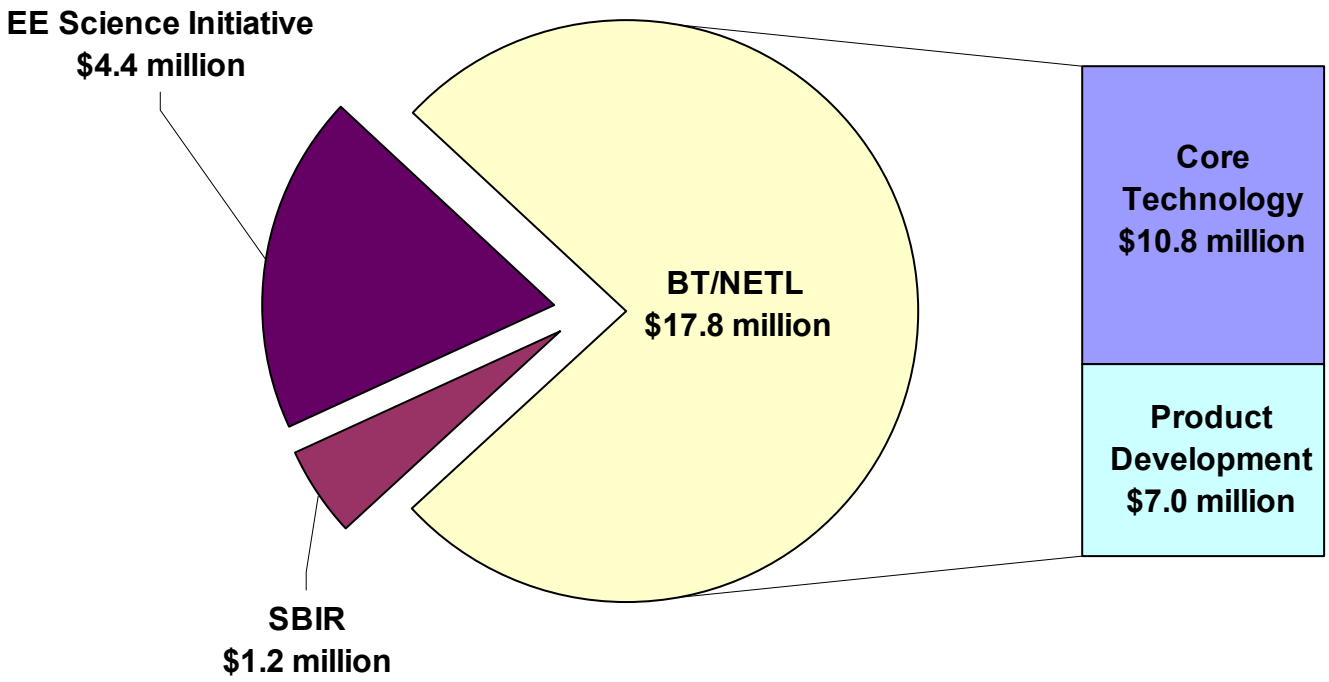


Total Contract Value of Projects: $63.6 million* (42 projects)

- LED: $29.8 million (23 projects)
- OLED: $33.8 million (19 projects)

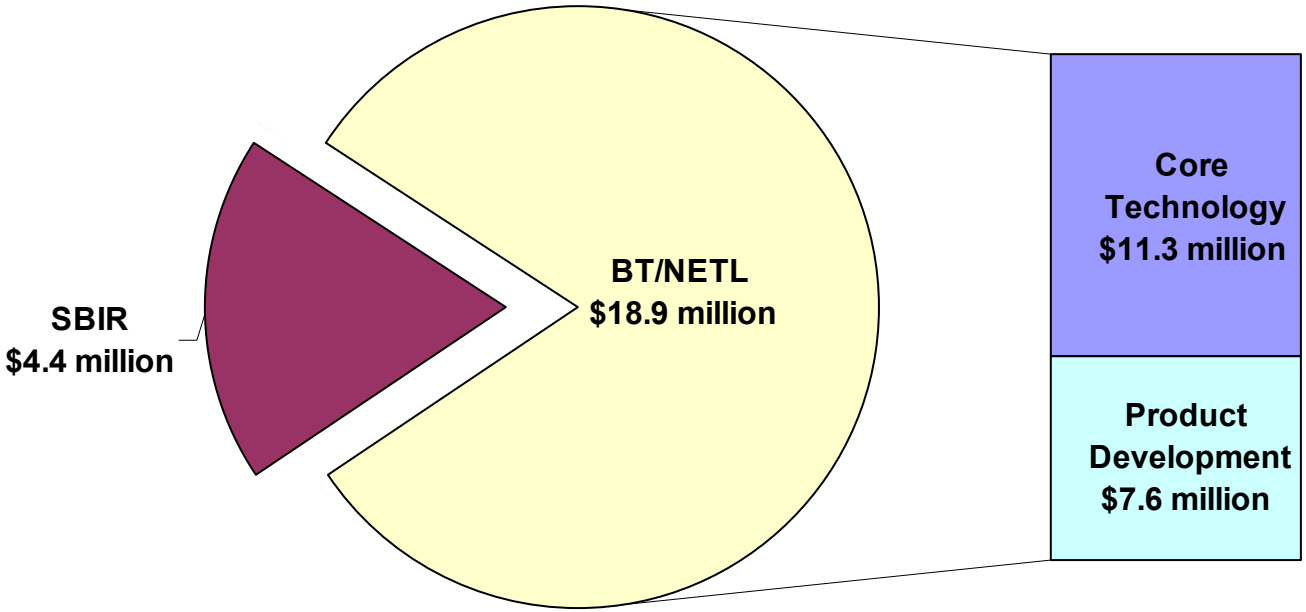
* The total contract value includes DOE funding ($46.8 million) and applicant cost-share ($16.8 million)

LED Project Funding Mechanisms



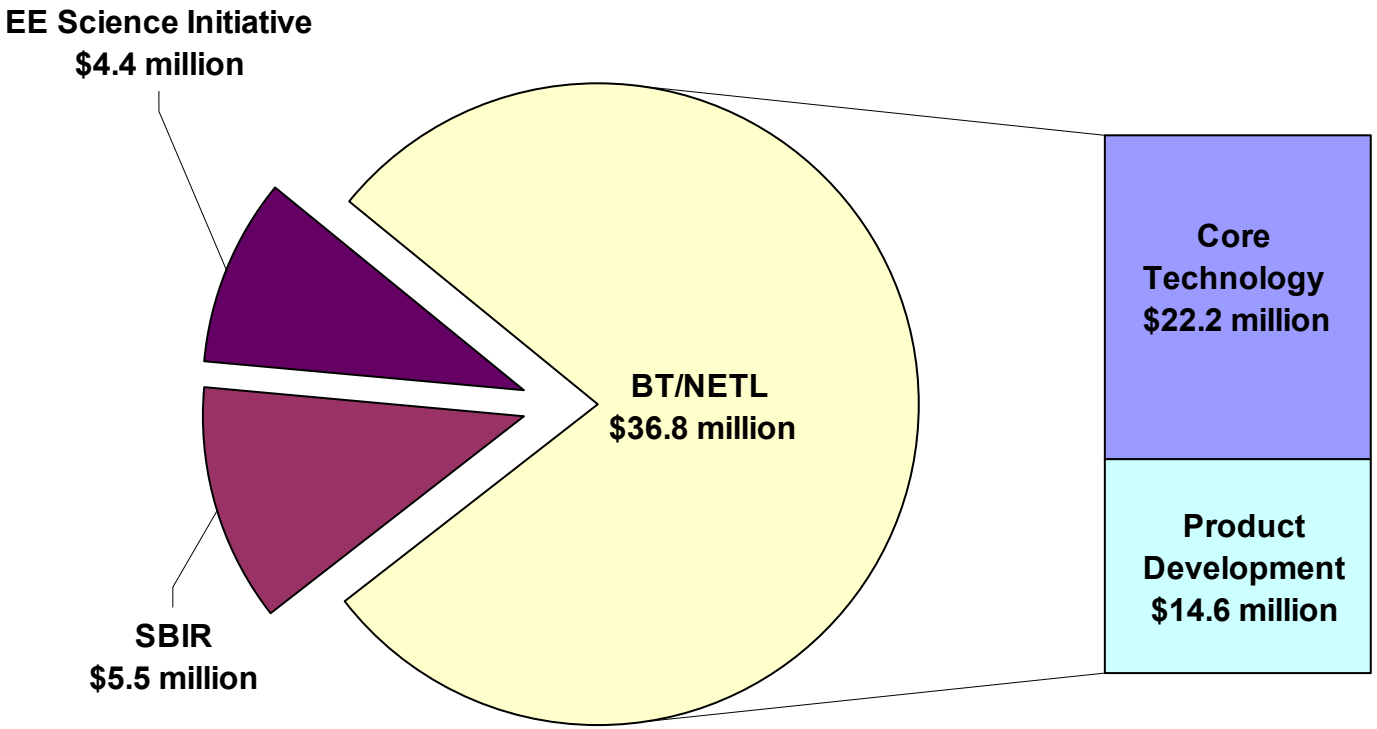
- DOE funds a total of $23.5 million in LED research.

OLED Project Funding Mechanisms



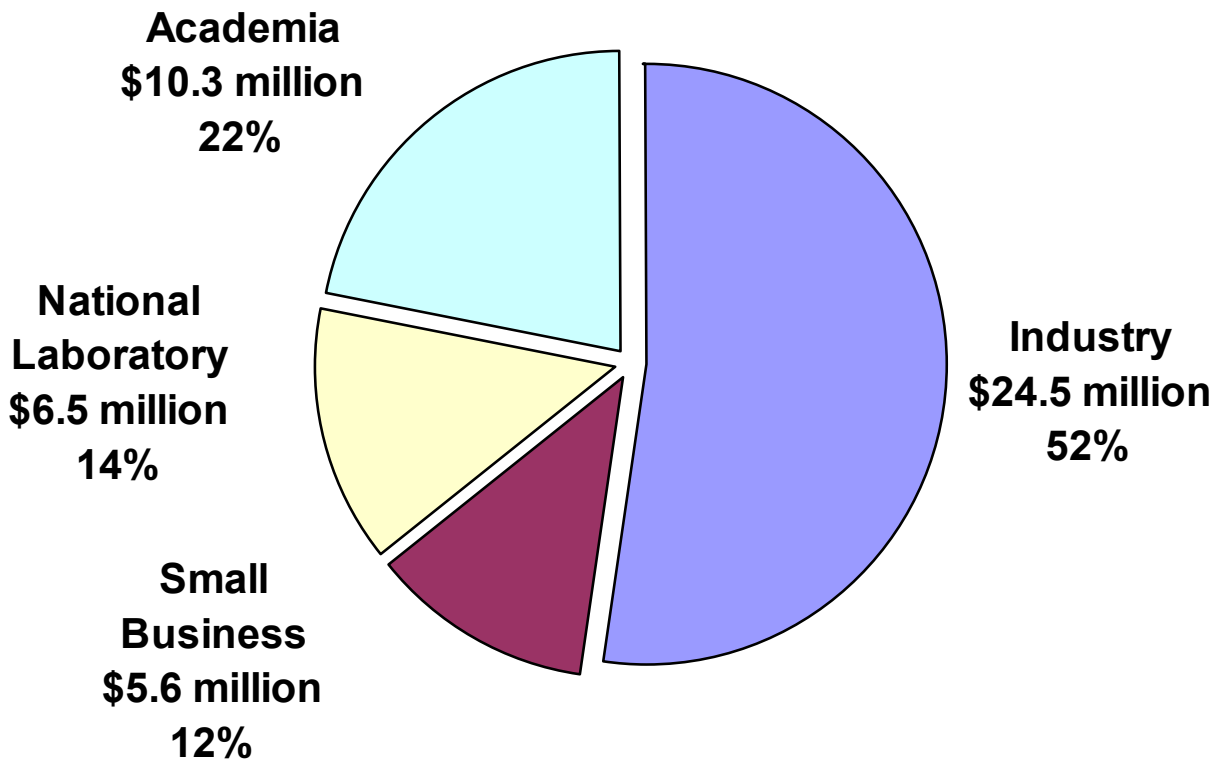
- DOE funds a total of $23.3 million in OLED research.

SSL Project Funding Mechanisms



- DOE funds a total of $46.8 million in solid-state lighting research.

Recipients of DOE Funding



- The Department funds solid-state lighting research in partnership with industry, academia, and national labs.

Core Technology Awards in FY'04

	Total # of Projects	$ Funding (million)
Light Emitting Diode		
High efficiency visible and near UV (<380nm) semiconductor technology materials for LED general illumination technology	5	$4.4
Advanced architectures & high power conversion efficiency emitters	0	0
High temperature, efficient, long-life phosphors, luminescent materials for wavelength conversion & encapsulants	1	$2.5
Organic Light Emitting Diode		
High efficiency, low voltage, stable materials for OLED general illumination technology (hosts, dopants, and transport layers)	4	$7.0
Strategies for improved light extraction and manipulation	0	0
Novel device structures for improved performance & low cost	1	$2
Total	**11**	**$15.9**

Product Development Awards in FY'04

	Total # of Projects	$ Funding (million)
Light Emitting Diode		
SSL luminaire design and materials	2	$2.7
High efficiency, reliable, intelligent electronics for SSL	1	$1.6
Organic Light Emitting Diode		
SSL luminaire design and materials	2	$5.3
High efficiency, reliable, intelligent electronics for SSL	0	0
Total	**5**	**$9.6**

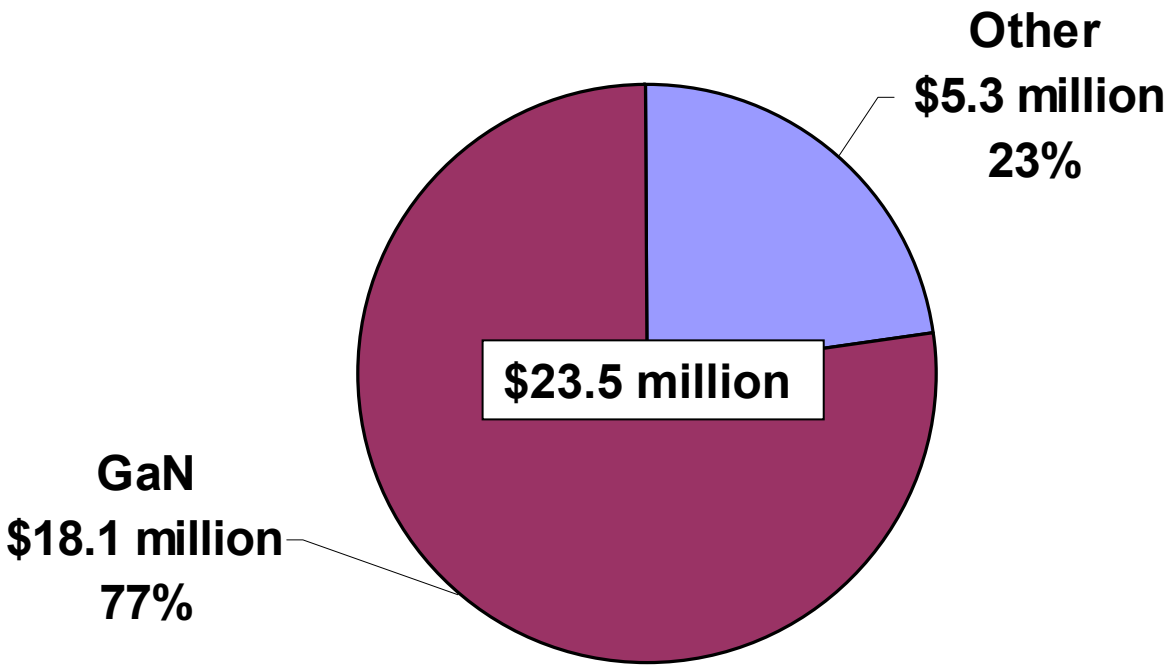
Total Portfolio: Core Technology

	Total # of Projects	$ Funding (million)
Light Emitting Diode		
High efficiency visible & near UV (<380nm) semiconductor technology materials for LED general illumination technology	10	$6.7
Advanced architectures & high power conversion efficiency emitters	3	$3.5
High temperature, efficient, long-life phosphors, luminescent materials for wavelength conversion & encapsulants	7	$8.6
Organic Light Emitting Diode		
High efficiency, low voltage, stable materials for OLED general illumination technology (hosts, dopants, & transport layers)	9	$8.8
Strategies for improved light extraction & manipulation	2	$0.85
Novel device structures for improved performance & low cost	5	$3.7
Total	**36**	**$32.2**

Total Portfolio: Product Development

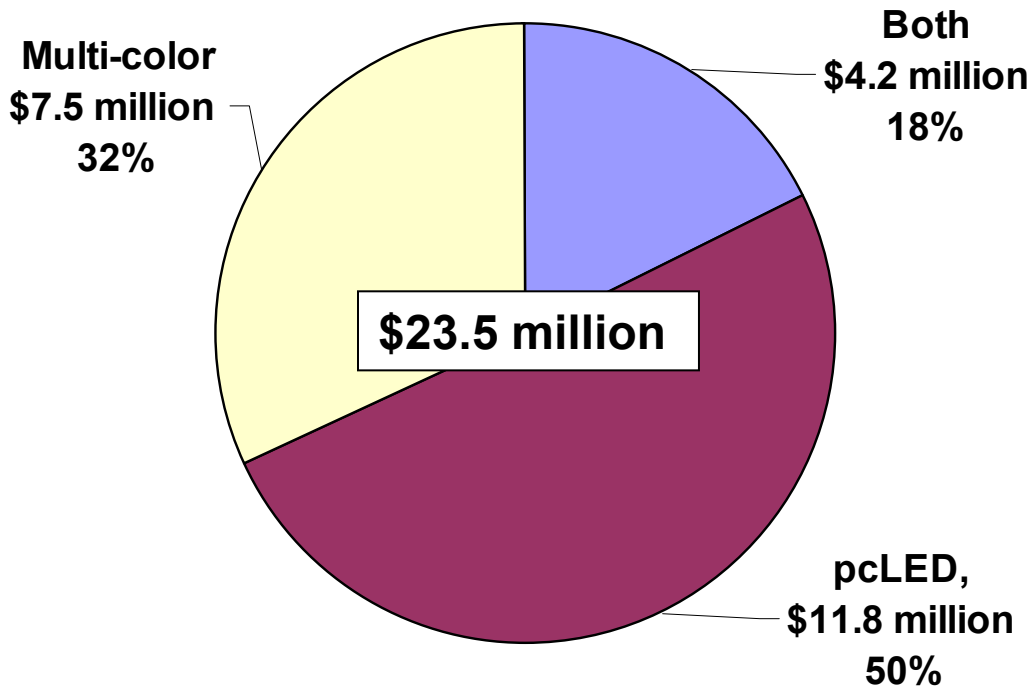
	Total # of Projects	$ Funding (million)
Light Emitting Diode		
SSL luminaire design and materials	2	$3.1
High efficiency, reliable, intelligent electronics for SSL	1	$1.6
Organic Light Emitting Diode		
SSL luminaire design and materials	3	$9.9
High efficiency, reliable, intelligent electronics for SSL	0	0
Total	**6**	**$14.6**

Compound Semiconductor Materials Systems



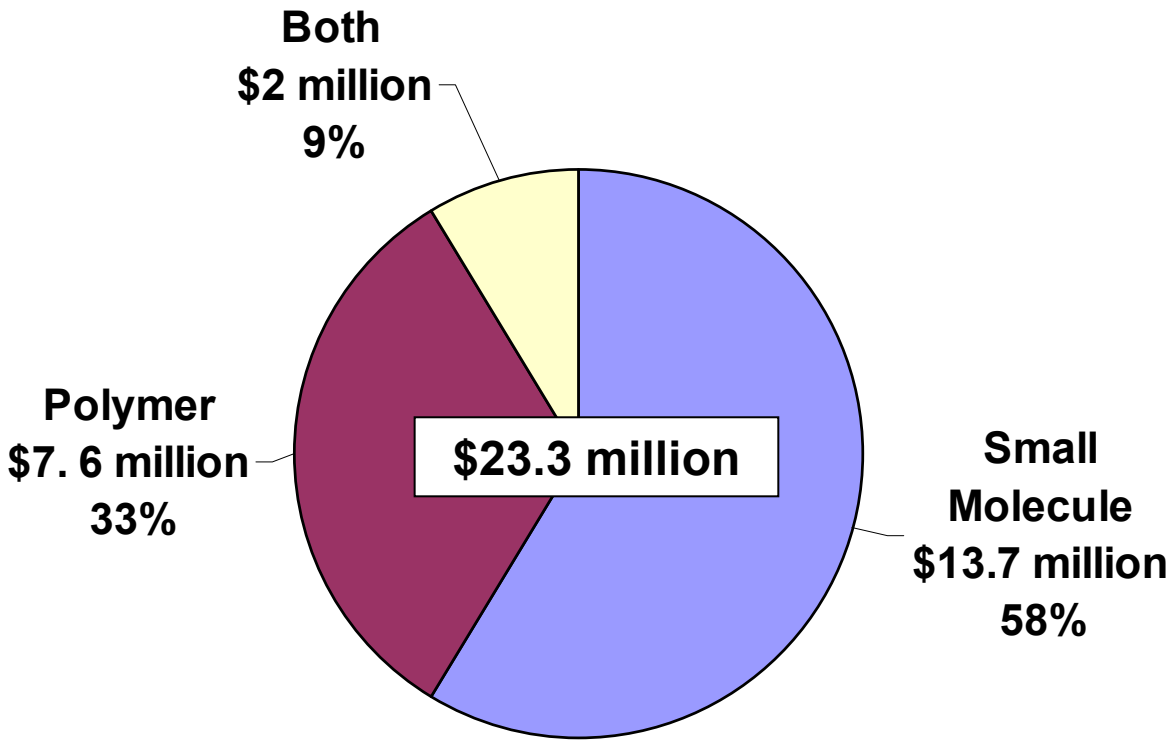
- Of the 23 LED projects, 19 involve research with Gallium Nitride (GaN) materials systems, and 4 involve work with other III-V material systems.

Methods for Creating White Light



- Of the 23 LED projects, 6 are studying multi-color systems, 11 are researching pcLED systems, and 6 are studying technologies that could apply to either method of creating white light.

OLED Material Systems



- Of the 19 OLED projects, 15 projects are researching small molecule OLEDs, three are researching polymer OLEDs and one could apply to either OLED material system.

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DOE SSL Commercialization Support

- Pull efficient products into the market
- Meeting held with “energy”- organizations
- Alliance, NEMA, ALA, others
- Tactics:
  - Energy Star™
  - Design Competition
  - Utility Promotion
  - Procurement
  - Consumer Information
  - Other